right shape. U.S. Pat. No. 5,545,291 describes a method that uses random placement. In this method, microstructures are assembled onto a different substrate through fluid transport. This is sometimes referred to as fluidic self-assembly. Using this technique, various blocks, each containing a functional component, may be fabricated on one substrate and then separated from that substrate and assembled onto a separate rigid substrate through the fluidic self assembly (FSA) process. The blocks which are deposited onto receptor regions of a substrate may include any of a number of different functional components, such as LEDs, pixel drivers, sensors, etc. An example of a particular type of block and its functional component is described in copending U.S. patent application Ser. No. 09/251,220 which was filed Feb. 16, 1999 by the inventor John Stephen Smith and which is entitled "Functionally Symmetric Integrated Circuit Die". This application is hereby incorporated herein by reference.

[0015] As noted above, **FIG. 1B and 1D** illustrate a display substrate **12** with blocks **14** formed in the rigid substrate **12**. These blocks **14** may be deposited through an FSA process. In the FSA process, a slurry containing the blocks **14** is deposited over the rigid substrate **12** and the blocks **14** rest in corresponding openings in the substrate **12**.

[0016] **FIG. 2** shows a block **14** and a circuit element **18** on the top surface of block **14**. Generally, blocks have a trapezoidal cross-section where the top of the block is wider than the bottom of the block.

[0017] **FIG. 3** shows block **14** in a recessed region of the rigid substrate **12**. Between the block and the rigid substrate is an eutetic layer **13**. The block has a top surface **18**.

[0018] **FIG. 4** shows a planar side view of a rigid substrate coupled to a rigid display backplane with a plurality of blocks between the display backplane **30** and substrate **12**. The plurality of blocks are functionally part of the display backplane **30** and are deposited onto receptor regions of the substrate **12**. Each block drives at least one transparent pixel electrode. The electrode pixel is fabricated over a transistor which is fabricated in the block.

[0019] **FIG. 5** shows a portion of an array in an active matrix display backplane. The control line rows **31** and **32** in this device are coupled to gate electrodes along a row and the control line columns **34** and **35** are coupled to data drivers which supply pixel voltages which are applied to the pixel electrodes. A column line **34** is connected to a source electrode of field effect transistor (FET) **36**. Another column line **35** is coupled to a source electrode of FET **37**. A row line **32** is coupled to the gates of both FETs **36** and **37**. The drain of FET **36** is coupled through capacitor **38** to a transparent pixel electrode along the row **32** formed by FETs **36** and **37**, and the drain of FET **37** is coupled through a capacitor to another pixel electrode along the row. In one typical example, the backplane may be formed by depositing blocks, using an FSA technique, into a rigid substrate (e.g., glass); each block contains a FET and a capacitor and is interconnected to other blocks by column and row conductors that are deposited onto the rigid substrate; and, the capacitor is coupled to a pixel electrode by another conductor that is deposited onto the rigid substrate. The active medium (e.g., a liquid crystal) is deposited at least on the pixel electrodes which will optically change the active medium's properties in response to the combined voltages or currents produced by the pixel electrodes. The active medium at a given pixel electrode **42** will appear as a square or dot in the overall checkerboard type matrix of the display. The actual size of the FETs and the pixel electrodes **42** are not now drawn to scale, but are shown schematically for the purposes of illustration. **FIG. 6** shows pixel electrodes **46** on top of a substrate **48**.

[0020] There are several disadvantages inherent to the related art. Rigid flat-panel displays are limited in that they are generally coupled to rigid objects. Flexible objects may cause too much stress on rigid flat-panel displays that could affect the electrical interconnections in rigid flat-panel displays.

[0021] Another disadvantage to these flat-panel displays is that they are manufactured in a batch operation. Batch operations inherently involve a certain amount of down time in production. This increases production time to fabricate display panels. Additionally, flat-panel displays are generally fabricated on rigid substrates that are not continuous in length. This also decreases productivity since the assembly of the flat-panel displays is interrupted until another substrate panel is available to assemble the flat-panel display.

SUMMARY

[0022] The present invention provides various apparatuses and methods for creating a display. One aspect of the invention involves creating a flexible active matrix display. Here, a flexible active matrix display is created by coupling an active matrix display backplane to a substrate.

[0023] Another aspect of the invention involves a flexible continuous substrate upon which multiple flexible displays are fabricated. Here, a flexible substrate is produced that has a pre-determined thickness and width, but the length of the flexible substrate is continuous (or, at least, continuous relative to a single display). The flexible continuous substrate, along with the display device components, are advanced through a web processing apparatus and separated into individual displays after fabrication. The separated components may be coupled to a mating display component. For example, a separated display component may be coupled to a television or a computer.

[0024] Another aspect of the invention relates to a flexible substrate with a reflective display backplane.

[0025] Another aspect of the invention relates to moving a flexible substrate through a web process apparatus. A web process apparatus has a plurality of support members that advance the flexible substrate through an in-line process. While the flexible substrate is moving (or while it is temporarily stopped), a slurry that contains a plurality of objects is deposited onto the flexible substrate in a manner similar to an FSA process. These objects slide into receptor regions in the flexible substrate. In one embodiment, the flexible substrate is coupled to a display tape that includes a display mechanism. The display tape is a flexible material such as polyether sulfone (PES), polyester terephthalate, polycarbonate, polybutylene terephthalate, polyphenylene sulfide (PPS), polypropylene, polyester, aramid, polyamide-imide (PAI), polyimide, aromatic polyimides, polyetherimide, metallic materials, acrylonitrile butadiene styrene, and polyvinyl chloride. The substrate, such as plastic, advances through the web process apparatus. In one embodiment, as the substrate advances through the web process apparatus,